REMARKS

Claim Objections

In the Office Action mailed on January 24, 2008, the Examiner objected to claim 27 and recommended that the phrase "variable values" should be changed to the phrase "numeric values." Claim 27 has been so amended, and Applicants appreciate the Examiner's helpful suggestion.

Claim Rejections; Antecedent Basis

Claim 9 was rejected by the Examiner as lacking antecedent basis. Applicants have amended claim 9 to correct that situation, and appreciate the Examiner's helpful suggestion. Claim 9 has been amended so that its preamble states "the method as recited . . ." which replaces the previous phrase "the electronic controller as recited . . . ." In addition, the Examiner's concern was for the phrase "the electronic controller," and this has been changed to say "said controller" which has antecedent basis in claim 1.

Prior Art Rejections

Although many of the claims have been allowed by the Examiner, independent claims 1 and 10 are again rejected as being anticipated by Asano (US 5,793,988), and the other rejected independent claim (i.e., claim 17) has been rejected as being obvious in view of the combination of Asano and Lo (US 6,026,141). Asano is the primary reference being relied on by the Examiner.

Claims 1 and 10 were previously amended to include the phrase "wherein said at least one modulating pattern set comprises a set of sideband frequencies that exhibit distinct patterns of electromagnetic energy." Claim 17 was previously amended to add the phrase, "wherein the concentrations of electromagnetic energy emissions of said first output data signal comprise a set of sideband frequencies that exhibit distinct patterns of electromagnetic energy." Thus it is clear that

the "set of sideband frequencies" is an important element of these three independent claims. (Support for this feature is found in the Detailed Description on page 7, lines 8-14, and also on page 7, lines 5-27. In addition, FIG. 7 graphically shows the effects of the sidebands.)

In the above-identified Office Action, the Examiner stated that the Asano reference discloses at least one modulation pattern set that comprises a set of sideband frequencies that exhibit distinct patterns of electromagnetic energy with the following statement:

> According to Asano, EMI radiation is caused by signals with same waveforms and fast repetition rates. The amount of EMI is proportional to the repetition rates. That is, different repetition rates will generate different patterns of EMI energy. The EMI radiation is reduced by EMI modulator that produces signals carried by different waveforms and have waveforms with long repetitive cycles as depicts in FIG. 11B. The EMI modulator produces waveforms with reduced EMI patterns. (Col. 2 L 20-67)

The Examiner's conclusion about Asano teaching signals with certain waveforms and reduced EMI patterns might be true, but that has nothing to do with Applicants' claims about generating sideband frequencies as part of a modulation pattern set (i.e., claims 1 and 10) or for concentrations of electromagnetic energy emissions of a first output data signal (i.e., claim 17). Simply stated, <u>Asano does not teach sideband frequencies</u>, and moreover, in one embodiment, Asano essentially teaches the opposite by "randomizing" its modulated data. Applicants' invention does not randomize the data, but controls the creation of modulating the data such that a set of sideband frequencies are created in a known manner, so that the EMI emissions are controlled in a known manner. This is not randomness.

In the Asano patent, the incoming data has a digital number added to it by an adder circuit, in which either a random number or some type of "counted number" is added to the data. This is the "modulating circuit" of Asano. Later the modulated data is then demodulated by a "demodulating circuit," which restores the original data after it has been transmitted. Some details of the Asano circuits are provided in FIGS. 2 and 3. In FIG. 3, Asano uses a four-bit latch **440** to receive the data, and uses a four-bit counter **410** that adds a known count value (or a random count value) to a four-bit adder circuit **420**. The output of the adder is the "X data" that is transmitted and later demodulated.

FIGS. 5 and 6 of Asano show an example set of waveforms when using the four-bit counter circuit depicted in FIG. 3. FIG. 4 shows the count value waveforms output by the counter circuit **410**, while FIG. 6 shows the waveforms of all of the pertinent data signals. As can be seen in FIG. 6, the least significant bit of the *data* is exactly the same as the least significant bit of the *counter*. This has the effect of completely eliminating all transitions of the output (or "X data") for the least significant bit. This would be a very fortuitous situation indeed for actual "live data." In other words, the major reduction in electromagnetic energy emissions is due solely to the fact that these numbers for the least significant bit happen to add up to Logic Zeroes, and thus no transitions at all occur for the least significant bit at the X-data output. In this situation the output EMI of course would definitely be reduced (in this case it becomes a DC voltage for the least significant bit).

Also in this example, the incoming data for bits 2, 3, and 4 are essentially repeat-cycle clock pulses that always make a transition per a known time interval, such that their data values go from Logic 0 to Logic 1, and back to Logic 0 in a repetitive cycle. This allows the counter values for bits 2-4 to smooth out the data such that the output for the "X-data" has exactly the same waveform as the counter values, and these waveforms are lower in frequency than the original data. This example of FIG. 6 is used for the example graphical data depicted on FIG. 11B, which makes it appear that the use of Asano's data modulation has a beneficial reduction in EMI emissions of about 10 dB (or 10 microvolts per meter). This dramatic EMI reduction is almost by magic, since it only would occur when all four data bits are essentially repeat-cycle clock transitions, which is exactly the type of test data that was presented in FIG. 6 of Asano. Rather than randomizing the data in this embodiment of Asano, the repeat cycle characteristics of the incoming data combined with the binary-type counts used in the counter waveforms of FIG. 6, combines to reduce the EMI that was originally depicted in FIG. 11A to the improved (reduced) EMI of FIG. 11B. This would only work with incoming data that is always this predictable, and any "live" actual data that would not be at all predictable would have a very different set of output frequencies for FIG. 11B.

The point being made here is that the Asano invention does not attempt to create sideband frequencies of the original data frequency spectrum, but in the example of FIGS. 3-6 the Asano

device only eliminates some of the spectral EMI intensity of the exact same frequencies that were depicted in FIG. 11A. It can be seen by close inspection of FIGS. 11A and 11B that when they are compared to one another (i.e., the non-modulated data with no EMI reduction vs. the modulated data), the spectral peaks occur at the <u>same frequencies</u> in both graphs.

Thus, Asano is <u>not</u> a system that reduces EMI by "spreading" the peak frequencies to other nearby frequencies in a controlled manner, such as a device that creates sideband frequencies that are related to an initial center frequency of the spectral characteristics of the incoming data (as in the present Lexmark invention of claim 1). Instead, Asano merely eliminates a certain amount of the EMI emissions in the stated example (FIGS. 3-6) of the Asano patent, mainly as a direct result of using precisely repetitive input data that was predictable enough that the binary count used by the four-bit counter **410** matched up so well to the incoming data that the adder **420** eliminated many of the transitions, including <u>all</u> of the transitions for the least significant bit. It is not realistic to consider the Asano invention to be something that "spreads" peak frequencies of incoming data to sidebands; instead Asano merely reduces the emissions at the <u>same frequencies</u> of the original data (if the data is "well ordered" as compared to the count values of the four-bit counter).

The Examiner pointed to FIG. 11B of Asano as being supportive of her conclusion that Asano anticipates claim 1. FIG. 11B is interesting, and compared to FIG. 11A (that has no data modulation), one can see that the Asano invention reduces the peak EMI emission intensity merely by lowering the amplitude at the same frequencies. But this example of Asano requires a very repetitive data pattern—almost like a clock signal (and not "true" data that realistically cannot be predicted in advance).

The results of FIG. 11B are essentially accidental based upon very repetitive input data, and even at that, the reduction in EMI was not due to "spreading" the EMI emissions to sideband frequencies, but was due to actually eliminating the number of transitions that occur (based on the fortuitous repeat cycle nature of the input data).

It should be noted here that, if the Asano embodiment that "randomizes" the input data is instead used, the results would not look like FIG. 11B. Actually, if the nature of the count values output by the counter **410** was truly random, then the resulting spectral response of a spectral

graph would be completely unpredictable with respect to where the actual frequency of transitions would end up. Certainly, they would <u>not</u> end up in any kind of <u>predictable pattern</u> such as a set of sideband frequencies.

In the instant application, FIG. 7 shows one of the effects of the present Lexmark invention, by which the center frequency at reference numeral **400** has three (3) sidebands both above and below that center frequency. These sidebands are intentionally generated by the present Lexmark invention and, in this example, the sidebands are organized so as to have approximately the same peak amplitude for each of the sidebands **410**, **412**, **420**, **422**, **430**, and **432**. While an actual operating device using the present Lexmark invention may not generate sidebands that are quite this well organized when being measured for its frequency response, it nevertheless is a desired goal to create sidebands when using the present Lexmark invention of claim 1. For Asano, no such goal is stated or suggested.

In fact, in FIG. 11B of Asano, it can be seen that the resulting EMI radiation patterns do not create sidebands at all. This supports Applicants' contention that the Asano reference is not teaching or suggesting the use of sideband frequencies when generating a modulation pattern set that exhibits distinct patterns of electromagnetic energy. Therefore, Applicants respectfully submit that the Asano reference does not anticipate claims 1 or 10, and does not help to render obvious claim 17.

<u>Conclusion</u>

Applicants have amended claims 9 and 27 to overcome certain informalities noted by the Examiner. Applicants have presented arguments to explain why independent claims 1, 10, and 17 are not anticipated nor obvious in view of the cited prior art. Applicants respectfully request the Examiner to reconsider and to allow all of the pending claims.

<u>Payment of Additional Fees</u>

Applicants are transmitting a fee payment form to pay for the RCE. The Director of Patents and Trademarks is hereby authorized to charge any underpayment or credit any overpayment of fees

incurred due to this amendment to Deposit Account No. 20-0095.

Applicants respectfully request the Examiner to favorably reconsider and allow all of the pending claims.

Respectfully submitted,
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